

Canyons & Caves

A Newsletter from the Resource Management Offices
Carlsbad Caverns National Park

Issue No. 20

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Edited by Dale L. Pate

Thanks to Paula Bauer, Bill Bentley & Kelly Thomas

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Look for Issues of *Canyons & Caves* at the following websites:
<http://www.caver.net/> Once there, go to the Canyons & Caves icon. Bill Bentley has placed all issues on his personal website.
<http://www.nps.gov/cave/> Thanks to Kelly Thomas the first thirteen issues can be downloaded as a PDF file from the park website.

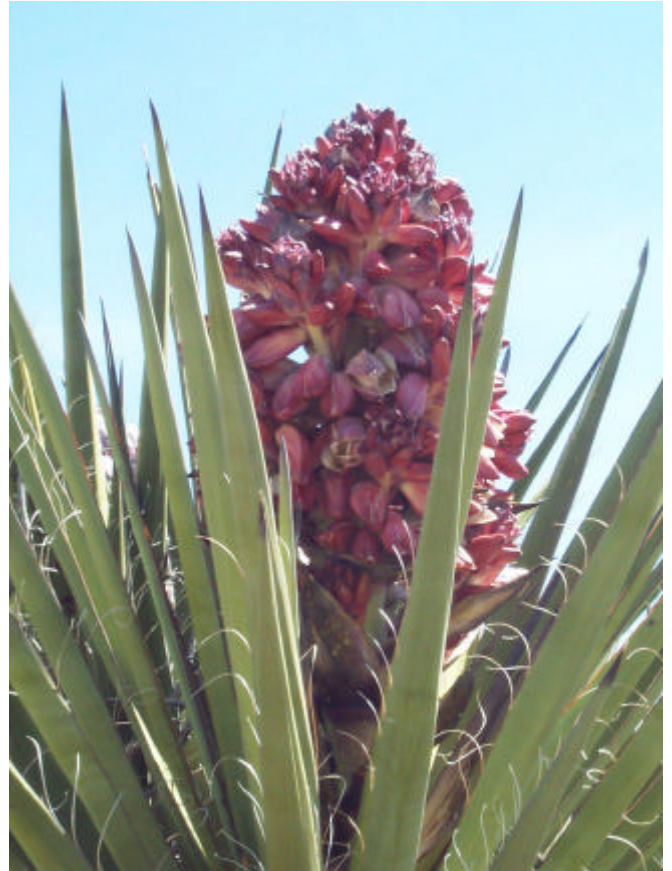
RESOURCE NEWS

AGE-DATING GUANO IN THE BIG ROOM - Pat Jablonsky has submitted a final report on her research of the age of guano from the Big Room in Carlsbad Cavern. The average date from three separate analysis is 45,830 +/- 1366 years before present.

WATER TANK REMOVAL - With the long-term goal of removing numerous structures from above Carlsbad Cavern, this 500,000 gallon water tank and associated insulated water line is slated to be removed during the 9-day period beginning March 22. This is the first of a number of man-made structures that will hopefully be removed and not replaced during the next few years.



This water tank and associated line are slated for removal beginning March 22, 2001.
(NPS Photo by Dale Pate)



March is the season for Torrey yucca blooms. This one was found near the Superintendent's Building.
(NPS Photo by Dale Pate)

STAFF COMMENTS INVITED IN TWO PLANNING EFFORTS - The park has begun working on two planning/environmental compliance documents: an Exotic Plants Management Plan/Environmental Assessment (EA) and a new Fire Management Plan/EA. We are in the staff scoping phase of both plans – meaning that any interested staff member can provide thoughts on the park's direction with regard to the issues. If anyone wishes to comment during this phase of the fire management plan, please provide written comments to Dale Pate, Jeff Denny, or Renée West. Send written comments on the exotic plants management plan to Renée West, Jeff Denny, or Mark Bremer. Public scoping will begin soon for both plans.

SURFACE BIOTECH SHUFFLE - **Gavin Emmons** has spent an *entire year* working with Surface Resource Management as a volunteer biological technician under the Student Conservation Association (SCA) Conservation Associate program. He has contributed approximately 2,200 volunteer hours at CAVE! Gavin has been an invaluable addition to our staff – that's the way we've come to think of him. His diligence, interest, skill, and independence have

contributed much to our efforts to understand and protect our resources. (See recent issues of Canyons and Caves for examples of his writing and photographic work.) Beginning in April, Gavin will be working as a seasonal Biotech to continue work on Bell's Vireo nesting and cowbird parasitism at Rattlesnake Springs.

This month, we have welcomed our new 12-week SCA volunteer **Luke Gaillard**. Luke comes from Vermont and started work March 12. **Susan Berg**, also a SCA volunteer, will begin working in the park in May.

We are preparing to hire a technician this summer to perform data entry for cave swallow monitoring.

OTHER SURFACE RESOURCES NEWS: **Renée West** is an invited speaker at an invasive plant workshop in Ajo, Arizona, April 19-20. The workshop is being organized by the Society for Ecological Restoration, The Nature Conservancy, and the Sonoran Institute. West will be talking about the NPS's Exotic Plant Management Team program and about multi-organization cooperation in the invasive plant field. **Dave Roemer** accompanied bat researchers Dr. Troy Best and John Hunt on a trip to Sonora, Mexico in February, to look for another Mexican free-tailed bat winter roost... unfortunately the cave was not found. Dave also visited Big Bend National Park in February to check out the flower scene with former CAVE Biotech Rob Taylor and former GUMO Biotech Lisa Green. **Myra Barnes**, Ph.D., is working with New Mexico State University in Las Cruces to gain an Adjunct Appointment to the faculty in the Department of Fishery and Wildlife Sciences. When the details are worked out, the appointment will benefit both the park and the university. Myra will also be speaking at the Society for Conservation Biology Annual Meeting in Hilo, Hawaii, July 29-August 1.

OUTTA HERE! - From July 27, 2000 to February 1, 2001, Rattlesnake Springs was home to a Great Kiskadee (*Pitangus sulphuratus*), a tropical species that is a rare visitor to these relatively northern latitudes. Winter storms and harassment by a Belted Kingfisher may have convinced the Kiskadee to end its 190-day tenure and return to warmer



The Great Kiskadee at Rattlesnake Springs.
(NPS Photo by Dave Roemer, January 20, 2001)

climes. During the fall and early winter, the Kiskadee was frequently observed at the springs fishing for minnows and crayfish. The bird was staggeringly popular with birders throughout the region and beyond, many of whom visited the park solely to see it.

LECHUGUILLA CULVERT REPLACEMENT PROJECT Though behind schedule, this project is nearing completion. Work on the air-lock system is ongoing and hopefully will be completed in the near future.

NEW CAVES - Over the past few months, 2 new small caves have been surveyed in the backcountry bringing the total number of caves in the park to 94.

REAL PROGRESS MADE ON 'SAVING THE SURFACE' - Ten park staffers and two volunteer vacationers from Wind Cave NP spent part of the Thursday morning, March 22 removing the state noxious weed Malta starthistle (MST) from the park's roadsides and parking areas. They removed several garbage bags full of mostly seedlings. If the seedlings had been allowed to bloom and seed out, this would have undoubtedly amounted to millions of noxious weed seeds. The workers were: Dianne White, Luke Gaillard, Gavin Emmons, Sean Haile, Lee Vest, Myra Barnes, Paul Burger, Stan Allison, Dale Pate, Renée West from CAVE, and Bob Kobza and Martha Jakobek, experienced weed fighters from WICA. Coupled with last weekend's volunteer effort by the Chihuahuan Desert Conservation Alliance, 45 hours have been spent, and the MST in the park is close to being eliminated. There will be one more official MST-Pulling Day for staff on Wednesday, April 11, 9-11 a.m. Meet at the west end of the Maintenance yard. We will clean up the four known remaining infestations and that should finish it (except for occasional monitoring).

NEW BIRD SPECIES ADDED TO PARK LIST - The first Common Raven ever recorded in CCNP was seen March 17, 2001. Steve West (local birder and compiler of the CCNP bird list) was pulling weeds in a volunteer effort when he spotted the raven flying over lower Walnut Canyon. Chihuahuan Ravens are more common than common ravens, at least here in the Chihuahuan Desert.

PARK NOW HAS TWO IMPORTANT BIRD AREAS - Two areas of Carlsbad Caverns National Park have recently been designated as Important Bird Areas (IBA) by the Randall Davey Audubon Center in cooperation with Hawks Aloft. These private organizations have designated Rattlesnake Springs and the Carlsbad Cavern Natural Entrance as IBAs. In all, seven areas in Eddy County have been designated, the most of any county in New Mexico. Almost one hundred sites have been nominated thus far in New Mexico.

IBAs are sites that provide essential breeding, migrating or wintering habitat for one or more species of bird. The IBA program, started in Europe by Birdlife International, has spread to North America through the American Bird Conservancy and the National Audubon Society. When completed, this project will identify sites across North

America that provide a network of areas for bird survival and perpetuation.

LANDSCAPE DESIGN IN THE CHIHUAHUAN DESERT

by Myra Barnes

Which animal has the greatest influence on the appearance of the Chihuahuan Desert? The abundant browsing deer certainly influence the shape of many plants. During droughts they may even kill madrone and other favored species. However, the effect of deer or other large browsing mammals is insignificant when compared to seed eating rodents. Small mammals have major effects, through seed predation and soil disturbance, on biodiversity and biogeochemical processes in the Chihuahuan Desert. Kangaroo rats are considered keystone species and their presence influences vegetation species composition and dominance. The density of tall perennial and annual grasses increased threefold when kangaroo rats were excluded from plots at long-term ecological research stations (LTERs) in the Chihuahuan desert and the number of grassland rodent species increased. The abundance of small granivorous species increases with a decrease or exclusion of larger kangaroo rats. Large-seeded annuals increased when all seed-eating rodents were removed from LTER exclosures. The removal of large seeds of competitively dominant plants by kangaroo rats resulted in an increase in small seeded plants and an increase in biodiversity. Competition between kangaroo rats and smaller rodents may be from direct competition for food and burrow sites or indirectly from vegetation change.



The banner-tailed kangaroo rat, *Dipodomys spectabilis*. (Photo by Ken Geluso)

Kangaroo rats particularly influence plant cover and species composition in the transition zone between desert scrub and grassland. Mounds of banner-tailed kangaroo rats (*Dipodomys spectabilis*) create microhabitats that support unique plant communities that are relatively rare in surrounding areas. Increased diversity results from local spatial heterogeneity with mounds providing microenvironments and soil disturbance patterns. Species diversity is highest immediately adjacent to active and inactive mounds and lower on highly disturbed soil of the mounds and in undisturbed areas between mounds. Annual plant biomass is higher on mounds than in inter-mound

areas. Intermediate levels of disturbance and small-scale environmental heterogeneity support high species diversity.

Changes in species composition and abundance in arid and semiarid landscapes will be one of the most sensitive indices of global climate change. It is believed that high levels of cattle grazing during the late 1800's shifted the grassland ecosystems of southern New Mexico to an alternate stable-state of desert shrubland. This shift was probably reinforced by a decrease in summer precipitation. The role of fire in the Chihuahuan desert, including Carlsbad Caverns NP, is less clear. Comparing fire history and changes in small mammal species composition and abundance could provide important information for the development of the Carlsbad Caverns Fire Management Plan. In 1991, Dr. Kenneth Geluso used Sherman live-traps to determine the relative abundance of small mammals along 97 transects in 26 habitat types. Some areas trapped by Geluso were burned 1-2 years prior to his study. Comparisons with his photos show that some of these grasslands are now dominated by shrubs. Other areas have burned since Geluso's 1991 study. Small mammal trapping is a relatively inexpensive way to monitor ecosystem changes. Mammal trapping can be used as a quick, short-term method to measure biodiversity in fire-impacted areas when more detailed vegetation monitoring projects are not possible. Climate, fire, predation, anthropogenic effects and other factors influence vegetation composition, diversity, and abundance. It is important to consider these interactive factors during research design and analysis.

The diversity and abundance of small mammals may also serve as indicators for the species composition, diversity and abundance of animals. Small mammal species composition and abundance at a site influences the distribution of insects, birds, reptiles and other mammals through vegetation-mediated microhabitat and macrohabitat change. They are also important prey species for raptors, snakes, and medium/large mammalian carnivores. Therefore, small mammals serve as good indicators of plant and animal diversity and ecosystem health.

SMALL MAMMAL TRAPPING IN THE PARK

by Gavin Emmons

For the past three months, Myra Barnes and Gavin Emmons in the Surface Resources Office have been developing a live-trapping project of small rodents in an attempt to better understand their diversity and distribution at Carlsbad Caverns National Park. The trapping effort is based on research from the early 1990s, developed by Kenneth Geluso and compiled in his report, "Rodents of Carlsbad Caverns National Park" (1992). After trapping throughout the park from 1990 to 1992, Geluso confirmed the presence of 27 species of rodents within the park boundaries. Building upon his methods and findings, Barnes and Emmons hope to design a trapping program that allows for surveys several times a year to give a more detailed and complete picture of rodent distribution and abundance in the park over time.

Methods and Materials

Trapping of rodents at Carlsbad Caverns National Park involves the use of Sherman live-traps, metal boxes with spring-triggered doors, and trap bait consisting of oats mixed with corn and pellets. The traps are arranged in random trap lines, spaced 10 meters apart. When possible – if the habitat is large enough – the trap lines are set in a 2x25 pattern (2 lines of 25 traps), for a period of 1 or 2 days. Because the majority of rodents in the park are nocturnal, the traps are set in mid-afternoon and checked the following morning. Trapped mammals are weighed and sexed before being released at the trap site. The use of gloves, ziploc bags, and plastic containment boxes allows for minimal physical contact between the researchers and rodents. Information recorded on field data sheets includes species names, weight, sex, age, location, habitat type, date, weather, GPS coordinates gathered for the trapped specimen, and any unusual observations of individuals (wounds, deformities, nearby burrows or dens, etc.). 26 habitat types have been defined according to those set out in Geluso's work, and account for environments on the escarpment, cliffsides, seabed, in arroyos and drainages, and at Rattlesnake Springs.

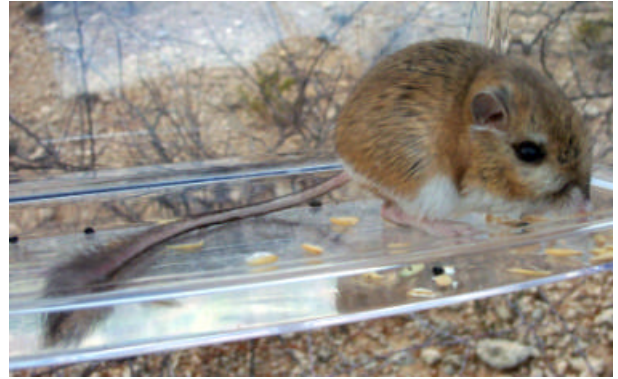
Findings

As of March 11, 2001, 25 trap lines have been set up since December, and 90 rodents representing 12 species have been found in 15 habitat types. These species are as follows: 17 white-ankled mice, 8 brush mice, 7 white-footed mice, 1 deer mouse, 8 mearns' grasshopper mice, 9 cactus mice, 24 merriam's kangaroo rats, 2 nelson's pocket mice, 1 texas antelope squirrel, 1 rock squirrel, 9 white-throated woodrats, and 3 southern plains woodrats. The nelson's pocket mice (*Chaetodipus nelsoni*) and the cactus mice (*Peromyscus eremicus*) are perhaps the most exciting of this group. Over a period of 2 years, Geluso found only 3 specimens of cactus mice, and two of the individuals found in the past three months were discovered in a habitat different from any of the prior specimens Geluso trapped. The nelson's pocket mice were found in the same rocky slope habitat as observed by Geluso. Given that this is the only location in the state where the species has been documented, it is exciting to know that they still occur as a viable population in the habitat observed by Geluso 10 years ago. As the rodent surveys develop, we will gain a more thorough understanding of the species diversity and population distribution of these oft-neglected but essential indicators of ecological health in the park.



Nelson's pocket mouse (*Chaetodipus nelsoni*) is only known in New Mexico from specimens found at Carlsbad Caverns National Park. This individual was trapped by G. Emmons on February 7, 2001.

Following is a selection of photographs of rodents trapped from December to March. (All photos are NPS photos taken by Gavin Emmons.)



Merriam's kangaroo rat (*Dipodomys merriami*).



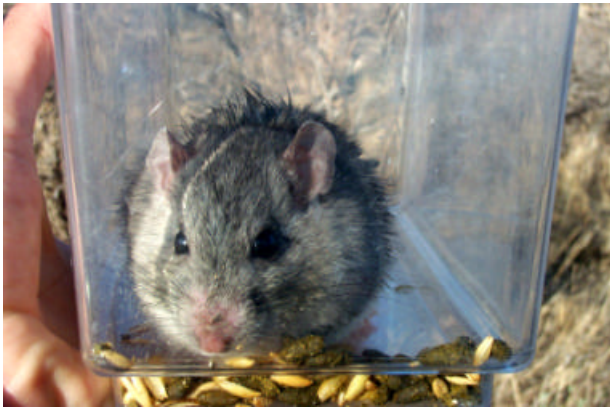
White-footed mouse (*Peromyscus leucopus*).



Banner-tailed kangaroo rat (*Dipodomys spectabilis*) burrow mound.



Mearns's grasshopper mouse (*Onychomys arenicola*).



Southern plains woodrat (*Neotoma micropus*).



Cactus mouse (*Peromyscus eremicus*).



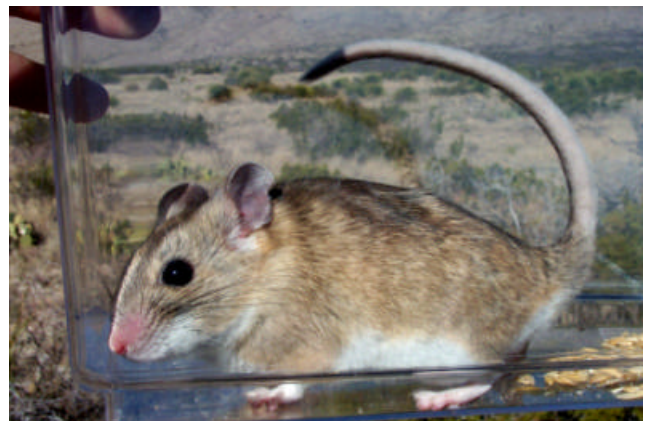
White-footed mouse (*Peromyscus leucopus*), juvenile.



White-ankled mouse (*Peromyscus pectoralis*), juvenile.



Texas antelope squirrel (*Ammospermophilus interpres*).



White-throated woodrat (*Neotoma albigula*).



Brush mouse (*Peromyscus boylii*).

RATTLESNAKE SPRINGS HABITAT RESTORATION CONTINUES

by Renée West

Volunteers from the Chihuahuan Desert Conservation Alliance and The Nature Conservancy (TNC), along with four members of the Exotic Plant Management Team (EPMT), braved icy winds to plant native willows at Rattlesnake Springs Saturday, February 24. In a total of 22 person-hours, they took approximately 300 branch cuttings from the native Goodding's willows and planted them in the muddy riparian soil on both NPS and TNC lands. (Dave Roemer's freshly brewed coffee was a welcome gift after two hours in the cold wind!)

The work was part of the ongoing habitat restoration effort begun almost two years ago. Exotic Russian olive trees are being removed gradually over the next few years by the EPMT. Wildlife habitat is being restored at the same time by planting native cuttings to fill the gaps. Along with the 100 willow and cottonwood cuttings that Surface Resources staff planted last February, we now have at least 400 possible new trees in the ground. Now, we need them to grow roots. You can't always tell in the first year whether you've had success or not: sometimes the cuttings will grow leaves and even flowers without growing roots. So if they come back the second year it's a good indication that roots are present. We will be monitoring the cuttings over the next two years.



Preparing cuttings of native Goodding's willow branches: cut them about a foot long, keep track of which end is down, and keep them moist in buckets with water. (NPS Photo by Renée West)

The exotic Johnson grass is another high-priority weed at Rattlesnake Springs. With help from the Maintenance Division (Roads and Trails) and the EPMT, we are treating patches of Johnson grass before it spreads.

Many thanks to this year's participants! They were:

Chihuahuan Desert Conservation Alliance (CDCA)

Greta Balderrama

Mark Bremer

Sandra Lynn

Dave Roemer

Renée West

NPS Chihuahuan Desert/Southern Shortgrass Prairie Exotic Plant Management Team

Sean Haile

Kristy Harmon

Todd Neel

Lee Vest

The Nature Conservancy (TNC)

Sonia Najera Meyer (formerly at NPS Mexican Affairs Office)

Rob Taylor (former CAVE biotech at Rattlesnake Springs)



Greta Balderrama from CDCA wrestles some thick brush to plant willow cuttings. She uses a piece of rebar to poke a hole first in order to avoid damaging the willow's meristem, the root-growing cells just under the bark. (NPS Photo by Renée West)



Kristy Harmon of the EPMT plants more willow cuttings. (NPS Photo by Renée West)

SHIELDS

by Stan Allison

Shields are a speleothem found in many of the caves within Carlsbad Caverns National Park. Slaughter Canyon Cave has several shields that can easily be seen from the flagged trail. At first glance they typically appear as oval to circular, angled planes with dripstone formations growing from them. Quite often they resemble parachutes. Shields range in size from a few centimeters to more than 3 meters in diameter.

So, how do they form? A close inspection of a shield reveals that it consists of two parallel, oval to circular plates each of approximately one centimeter thick. The gap between the plates is extremely thin, near capillary size. Shields typically are attached to a cave wall, ceiling or floor. This attachment point is typically an extremely thin crack. It is this capillary crack that provides the calcite-rich water that

forms the shield. As with other types of calcite formations, the water becomes saturated in respect to calcite as the water percolates down through the limestone above the cave. As the water emerges through the capillary crack the calcite forms on either side of the thin crack, forming the two layers of the shield. Since evaporation is greatest at the edge of the shield, growth occurs around the radial edge of the shield and in the plane of the two layers. Since the extremely thin crack is the source of the minute amounts of calcite bearing water, the shield will form at the same angle as the crack that formed it. Just as a crack can have a steep or shallow angle, shields may form with a steep, near vertical plane, while others form along horizontal cracks giving them a nearly flat plane.



A Shield found in Slaughter Canyon Cave. (NPS Photo by Dale Pate)

A. Bevan introduced the term shield in 1931 based on observations from caves in Virginia. In 1950 a Czech Speleologist, J. Kunsky first came up with the present theory of shield formation. It used to be thought that shields were a rare speleothem, but now they are known to be fairly common. Numerous caves in the Guadalupe Mountains have fine examples of shields.

REFERENCE: Carol Hill and Paolo Forti, *Cave Minerals of the World*, Second Edition

COUNTING BIRDS

by Renée West

The Spring Bird Count this year will be Saturday, May 12. The spring count is always exciting because the migratory birds are back, singing and wearing their colorful breeding plumage. The annual Christmas Bird Counts (CBCs) are interesting for different reasons: it's fun to see which species hang around and which don't; fun to see which ones come here to spend the winter. And there are always surprises.

Last Christmas (2000) there were several wonderful surprises, including several species never before counted on a CBC here, and a record number of species on the Carlsbad Caverns National Park count. CBCs are run on circular territories with a 7.5-mile radius from a center point. In our area, there are four official CBCs: Carlsbad Caverns National Park (centered on the old Lowe ranch site), Loving, Lakes Avalon-Brantley, and Guadalupe Mountains National Park. For the four area counts, the total of 162 species was the highest number ever. Twenty-nine volunteers participated in the four counts, including several staffers and SCAs from the two national parks.

The Spring Bird Counts are run on a county-wide basis. Anyone who is interested in participating can contact Steve West, the compiler of the Eddy County Spring Count, or Renée West at CCNP (ext. 364). There is plenty of area to be covered, so everyone is welcome, regardless of expertise or amount of time they can contribute.

At Christmas, we counted 94 different species for the CCNP count circle – the highest number of species in the history of the Caverns count, which goes back to 1957. The star of the show was the Great Kiskadee, a tropical flycatcher known largely from the lower Rio Grande valley south to Argentina. This bird lived at Rattlesnake Springs from July 2000, through early February of this year. It was the first Christmas count record ever for great kiskadee in the state of New Mexico. (New Mexico CBCs started in the 1930s.)



Great Kiskadee at Washington Ranch. Photo @ Jerry R. Oldenettel

Other rare birds counted on the CCNP 2000 CBC included: northern goshawk, Virginia rail (a wading bird), sora (also a wading bird), juniper titmouse, common yellowthroat, orange-crowned warbler, and red crossbill.

On the Avalon-Brantley count, a broad-billed hummingbird was the first ever on a New Mexico CBC. Other unusuals on that count included: Pacific loon, brant (a goose), black-bellied plover (a first-ever record for New Mexico in winter), rufous hummingbird, and another unidentified hummingbird. (Hummingbirds here in the winter are very rare, and this time there may have been three species present!) The Loving count found a black-legged kittiwake (an Arctic gull that winters in the Pacific; it was the third record for New Mexico in winter), winter wren, and snowy plover.

In the Guadalupe Mountains National Park count circle, the unique species included: Montezuma quail, downy woodpecker, plumbeous vireo, and cedar waxwing.

If you want to see a complete species list for any of the bird counts, contact Steve or Renée West. Bird counts are organized by the American Birding Association with the U.S. Fish and Wildlife Service.

CAVE CRICKETS

by Dale Pate

There are three species of cave (or camel) crickets known from Carlsbad Caverns National Park. Cave crickets are arthropods that belong to the class of Insecta. Insects have three body regions, three pairs of legs and one pair of antennae. Cave crickets found in the park belong to the genus *Ceuthophilus*. This genus contains more than 80 known species that are distributed throughout North America from the Atlantic to the Pacific and from Labrador and British Columbia in Canada to the state of Durango in Mexico. These cricket-like insects have rounded backs and are nocturnal. Many of the species are found in caves while the rest live in forest floor debris or burrows in deserts or grasslands. Many cave species migrate outside of the caves at night to feed.

The three known species from the park are *Ceuthophilus carlsbadensis*, *C. longipes* and *C. conicaudus*. A fourth species, *Ceuthophilus pallidus*, is known from several other caves in Eddy County, but not from any park caves. Both *Ceuthophilus carlsbadensis* and *C. longipes* were described as new species by A. N. Caudell in 1924 from specimens collected in Carlsbad Cavern during the 1924 National Geographic Society expedition.



Cave Crickets of the park. From left to right: *Ceuthophilus longipes*, *C. conicaudus*, and *C. carlsbadensis*. (Photo courtesy Diana Northup)

Ceuthophilus carlsbadensis - This species is found in many caves throughout New Mexico and Texas and is very common in Carlsbad Cavern. Characteristics for this species show very little adaptation for living in caves and they tend to live in food-rich areas. Studies by Diana Northup and others have shown that *C. carlsbadensis* are found in high numbers in Bat Cave and in Left-hand Tunnel and the Big Room adjacent to the Underground Lunch room area.

Ceuthophilus longipes - This species is known from numerous caves in the park. This species is also more cave-adapted and is found in food-poor areas. These cave crickets can be found throughout Carlsbad Cavern, but are the dominant cave cricket in the Sand Passage in the New Section. *C. longipes* is smaller and lighter in color and has longer legs and antennae than *C. carlsbadensis*.

Ceuthophilus conicaudus - This species is known from caves and surface sites in Texas, Oklahoma and New Mexico. *C. conicaudus* falls between *C. carlsbadensis* and *C. longipes* in cave adaptation traits. This species is only found sparsely in Carlsbad Cavern but is the dominant cave cricket in Spider Cave and a few other park caves.

Many cave crickets live in the front parts of caves only to leave at night to forage. Their diet consists of small insects, microbes, possibly algae or fungi and each other. A number of other creatures, in turn, feed on cave crickets. These include bats, raccoons and ringtails. Cave crickets, their eggs and guano are important food sources for other cave organisms. Cave crickets found in large cave systems like Carlsbad Cavern will not leave every night to feed. Migration does occur though. During one of Diana Northup's studies, crickets marked in the Sand Passage were noted later on above the Bat Cave seating area in the Main Corridor and in the Queen's Chamber. Crickets marked in Left-hand Tunnel were noted near Crystal Springs Dome in the Big Room

Female cave crickets can easily be distinguished from males by their ovipositor (the device they use for laying eggs), a pointed protrusion on the end of their abdomen.

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